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Tadauchi, Osamu

Xu, Huan-li

徐, 環李

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A Revision of the Subgenus *Simandrena* of the Genus *Andrena* of Eastern Asia with a Key to Palaearctic Species (Hymenoptera, Andrenidae)^{1), 2)}

Osamu TADAUCHI

Entomological Laboratory, Faculty of Agriculture,
Kyushu University, Fukuoka, 812 Japan

and

XU Huan-li

Institute of Zoology, Academia Sinica,
Beijing 100080, China

Abstract. East Asian species of the subgenus *Simandrena* of the genus *Andrena* are revised and 10 species are recognized from China, Japan and Korea. Three new species, *Andrena* (*Simandrena*) *tianshana*, *wuae* and *platydepressa* are described from China. One new synonym, 1 new status and 2 new records are included. A key to species of the subgenus *Simandrena* in the Palaearctic region including 9 European and North African species is presented.

Introduction

After Smith (1869) described *Andrena halictoides* from Japan and Morawitz (1880) described 4 new *Andrena* species from North China and Mongolia, several authors treated this genus based on expeditions to Eastern Asia (e.g., Strand, 1915; Alfken, 1929, 1936). Yasumatsu (1941) made the first check list of *Andrena* in Eastern Asia including China, Korea, Japan, Taiwan and the Maritime Districts of Russia. Hirashima (1962-1966) studied Japanese species of this genus and Tadauchi and Hirashima (1983-1988) revised several subgenera occurring in Japan. Tadauchi (1989) listed 83 species of *Andrena* from Japan. With respect to Chinese and Korean *Andrena*, 83 species have been recorded by Yasumatsu (1941), Wu (1941), Wu (1965,

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- 1) Results from the China-Japan Co-operative Study on "Studies on Systematics, Evolution and Biogeography of Asian *Andrena* (Hym., Apoidea, Andrenidae). No. 1.
 - 2) Contribution from the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (Ser. 4, No. 61).

1982a, 1982b, 1992), Kim (1985), and others, and 44 species by Kim & Kim (1983), Kim and Kim (1989) and Tadauchi & Lee (1992), respectively. From Mongolia, Kamchatka, Saghalien, Amur, Siberia and Formosa about 20 species were recorded in the studies by Morawitz (1880), Cockerell (1911), Matsumura (1911), Friese (1914, 1922), Alfken (1929) and others. Recently one of us, Tadauchi, participated in the Korea-Japan Cooperative Science Program in 1991 and 1992 and also has started a China-Japan Cooperative Study since 1993. We have had an opportunity to examine specimens widely collected in Eastern Asia.

The present paper and the future issues of the same series of our work are mainly based on the material preserved in the Zoological Institute of Academia Sinica, Beijing, and the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka. We also use or will use the type and normal specimens borrowed from the following museums and institutes: the Natural History Museum, London; National Museum of Natural History, Smithsonian Institution, Washington D.C.; American Museum of Natural History, New York; Zoological Museum, Berlin; Zoological Institute, Academy of Sciences of Russia, St. Petersburg; Oberijsterreichischen Landesmuseums, Linz.

In the present study we treat the subgenus *Simandrena* of the genus *Andrena*. The subgenus is found both in the Palaearctic and Nearctic regions. Warncke (1968) included 8 European species and 2 North African species in the subgenus, and LaBerge (1989) revised the species of the Nearctic region, treating 8 species. Alfken (1935) and Warncke (1966, 1973) described 3 species from Asia Minor to Afghanistan. Osychnyuk (1977) recorded 7 species of *Simandrena* from European Russia. With respect to East Asian species of *Simandrena*, Hirashima (1952) recorded one each from Japan and Korea. Tadauchi and Hirashima (1983) revised the subgenus for Japan and recognized 4 species. From Korea, Kim and Kim (1989) recorded one subspecies and Tadauchi and Lee (1993) listed 4 species. From China, Wu (1985) recorded 2 species.

In this study we recognize 10 species from Eastern Asia, one of which occurs also in Europe, 3 are new species and 2 are new records from China. We also recognize one new synonym and one new status. We present a key to species of the subgenus *Simandrena* in the Palaearctic region, including 9 European and North African species available for the present study. The holo- and paratypes designated in the present paper are preserved in the Zoological Institute of Academia Sinica, Beijing and some paratypes are in the Entomological Laboratory, Kyushu University, Fukuoka.

Terminology and Abbreviations

Morphological terms mainly follow Michener (1944) and Hirashima (1962). Abbreviations used in the series of this study are as follows: PP = punctures; IS = interspaces between punctures; T_n , S_n = metasomal tergum and sternum n ; FL_n = flagellar segment n ; L, W = maximum length and width; BL = body L (from antenna1 base to tip of pygidial plate); WL = L of forewing including tegula; HL = head L, from top of vertex to lower margin of clypeus excluding process of labrum; HW = head W; FVL, FVW = maximum length and width of facial fovea; FL1, FL2 = length of flagellar segments 1 and 2 of the male (along lower surfaces of segment when antennae stretched forward); EL, EW = L and W of eye; CPL = clypeal L; GW = W of genal area seen laterally; OOD = ocellocular D; POD = postocellar distance; OCD = ocellocipital D; MsW = mesosomal W (between outer rims of tegulae); MtW = metasomal W.

Subgenus *Simandrena* Pérez

Simandrena Perez, 1890, *Actes Soc. Linn. Bordeaux*, 44: 174; Hedicke, 1933, *Mitt. zool. Mus. Berlin*, 19: 218; Cockerell, 1936, *Pan-Pacific Ent.*, 12: 145; Lanham, 1949, *Univ. Calif. Publ. Ent.*, 8: 195; LaBerge, 1964, *Univ. Nebraska St. Mus. Bull.*, 4: 304; Hirashima, 1965, *J. Fac. Agr., Kyushu Univ.*, 13: 497; Warncke, 1968, *Mem. Est. Mus. zool. Univ. Coimbra*, (307): 87; Osychnyuk, 1977, *Fauna Ukraini*, 12 (5): 233; Tadauchi & Hirashima, 1983, *Esakia*, (20): 81; LaBerge, 1989, *Trans. Amer. ent. Soc.*, 115: 1. Type-species: *Andrena propinqua* Schenck, 1853 = *Andrena dorsata* (Kirby, 1802), designated by Hedicke, 1933.

Platandrena Viereck, 1924, *Canad. Ent.*, 56: 21; Hedicke, 1933, *Mitt. zool. Mus. Berlin*, 19: 217; Lanham, 1949, *Univ. Calif. Publ. Ent.*, 8: 212. Type species: *Andrena nasonii* Robertson, 1895.

Stenandrena Timberlake, 1949, in Lanham, *Univ. Calif. Publ. Ent.*, 8: 213; LaBerge, 1964, *Univ. Nebraska St. Mus. Bull.*, 4: 304. Type species: *Andrena pallidifovea* (Viereck, 1904).

Diagnosis: Small to moderately large species; pronotum without humeral angles; propodeal corbicula in female complete, without interior hairs; dorsal area of propodeum outlined by minute but distinct raised ridges along the sutures; trochanteral floccus complete; tibial scopa moderately long to often extremely short and not arranged; hind tibia broadly expanded subapically.

Key to the Palaearctic females of the subgenus *Simandrena**

1. Metasomal terga ferruginous; hairs on thorax scale-like, fulvous; Greece, Turkey, Palestine to European Russia [additional useful characters: tibial scopa long, well arranged; clypeus dulled; dorsal face of propodeum tessellate, not roughened with shallow punctures; posterior depressions of metasomal terga not well indicated, tessellate, impunctate]. *transitoria* F. Morawitz
- Metasomal terga black; hairs on thorax normal. 2
2. Flagellar segment 1 longer than segments 2 and 3 together; Turkey, Yugoslavia to France [propodeal enclosure with only a few rugulae basally; supraclypeal area with longitudinal rugulae; dorsal face of propodeum tessellate, with shallow punctures]. *thomsoni* Ducke
- Flagellar segment 1 shorter than or as long as segments 2 and 3 together. 3
3. Clypeus shagreened and dulled, with no indication of punctures. 4
- Clypeus shiny to weakly tessellate with punctures. 5

* Four species, which we could not examine, are excluded from the present key as follows: *Andrena venerabilis* Alfken, 1935 from Jordan; *A. melba* Warncke, 1966 from Caucasus; *A. jalalabadensis* Warncke, 1973 from Afghanistan; *A. antigana* Perez, 1895 from Spain.

4. Metasomal tergum 1 densely tessellate, with obscure indication of microscopical punctures; posterior depressional area of metasomal terga densely tessellate; propodeal enclosure with only a few rugulae basally; dorsal face of propodeum tessellate with shallow punctures; Algeria and Morocco. **breviscopa** Perez
- Metasomal tergum 1 smooth and shiny with dense, small punctures; posterior depressional area of metasomal terga shiny and smooth with dense punctures; propodeal enclosure rugose on 1.13 of basal area; dorsal face of propodeum roughened; Middle Europe to European Russia, Middle Siberia, China (northwest). **combinata** (Christ)
5. Hind tibia1 scopa long, moderately well arranged. 6
- Hind tibia1 scopa very short to short, not well arranged. 7
6. Clypeus smooth and polished with broad longitudinal median and a transverse apical impunctate spaces; supraclypeal area roughened with strong punctures; hairs on vertex yellowish; hairs on mesoscutum fulvous; clypeus quite convex; China (northwest).
..... **tianshana**, n. sp.
- Clypeus weakly tessellate and punctate with median longitudinal tessellated space; supraclypeall area with shallow punctures; hairs on vertex pale brownish; hairs on mesoscutum pale yellowish; clypeus convex; China, Korea (south & central).
..... **koma** Hirashima
7. Flagellar segment 1 shorter than segments 2 and 3 together. 8
- Flagellar segment 1 as long as segments 2 and 3 together. 11
8. Metasomal tergum 1 shiny with dense small punctures; propodeal enclosure rugose on 1/3 of basal portion; dorsal face of propodeum tessellate with shallow punctures, not roughened; facial fovea very broad, occupying nearly full space between orbit and post ocellus; clypeus rather broad and quite convex; Algeria and Morroco [pygidial plate without raised area; caudal fimbria black]. **rhypara** Perez
- Metasomal tergum 1 weakly tessellate with microscopical fine punctures; propodeal enclosure rugose all over to 2/3 of basal portion; dorsal face of propodeum roughened; facial fovea not broad occupying 1/2 to 2/3 space between orbit and post ocellus; clypeus convex. 9
9. Propodeal enclosure large and distinctly wrinkled all over, with transverse keel apically; pronotum with subapical margin entire or sometimes very weakly emarginate in the middle; Japan and Korea (south & central) [pronotum without a median longitudinal line; facial fovea narrow, occupying about 0.7 space between orbit and post ocellus; vertex with pale brownish hairs; smaller, length 8-9 mm].
..... **yamato** Tadauchi et Hirashima
- Propodeal enclosure distinctly wrinkled, but apical portion weak to tessellate without apical transverse keel; pronotum with subapical margin emarginate in the middle. 10
10. Pronotum with median longitudinal line distinct; propodeal enclosure wrinkled nearly all over; hairs on vertex, mesoscutum and scutellum pale yellowish; process of labrum not emarginate in the middle; metasomal tergum 1 weekly tessellate with microscopic punctures; facial fovea broad occupying about 0.8 space between orbit and post ocellus; caudal fimbria light brownish; larger, length about 9-10 mm; Japan.
..... **opacifovea** Hirashima

- Pronotum with median longitudinal line obscure; propodeal **enoclosure** less wrinkled, tessellate on 1/3 of apical portion; hairs on vertex, mesoscutum and scutellum fuscous; process of **labrum** emarginate in the middle; metasomal tergum 1 distinctly tessellate, nearly impunctate or with microscopic punctures; facial fovea narrow occupying about 0.7 space between orbit and post ocellus; **caudal** fimbria fuscous; smaller, length about 8-9 mm; Japan (**Amami-Oshima** Is.). ... **austrinsularis** Tadauchi et Hirashima, n. stat.
- 11. Posterior depressional area of metasomal terga smooth and shiny with distinct dense punctures..... 12
- Posterior depressional area of metasomal terga moderately to weakly tessellate with punctures..... 13
- 12 Clypeus smooth; propodeal enclosure rugose on basal half; facial fovea broad; supraclypeal area strongly punctate, not roughened; vertex not round; metasomal hair bands on terga 3-4 complete; pygidial plate with raised area not tessellate; China (north). **wuae**, n. sp.
- Clypeus tessellate; propodeal enclosure rugose on basal 2/3; facial fovea narrow; supraclypeal area roughened; vertex round; metasomal hair bands on terga 3 interrupted medially; pygidial plate with raised area tessellate; England, Middle and South Europe to European Russia. **lepida** Schenck
- 13. Dorsal face of propodeum tessellate with shallow punctures, not roughened; facial fovea very broad, occupying nearly full space between orbit and post ocellus; Middle Europe to European Russia [metasomal tergum 1 tessellate, with obscure punctures; posterior depressional area of metasomal terga tessellate, with indistinct punctures].
..... **congruens** Schmiedeknecht
- Dorsal face of propodeum roughened; facial fovea narrow. 14
- 14. Metasomal tergum 1 tessellate, with fine punctures; supraclypeal area with longitudinal rugulae; process of **labrum** narrow and emarginate in the middle; England and Middle Europe to European Russia. **dorsata** (Kirby)*
- Metasomal tergum 1 shiny and smooth, with dense distinct punctures; supraclypeal area without longitudinal rugulae; process of **labrum** not emarginate in the middle. 15
- 15. Propodeal enclosure weakly rugose on basal half. 16
- Propodeal enclosure distinctly rugose all over. 17
- 16. Clypeus shiny and smooth, with distinct punctures; metasomal terga tessellate, with small punctures; posterior depressional area occupying about 1/3 of tergum, tessellate; Japan.
..... **nippon** Tadauchi et Hirashima
- Clypeus weakly tessellate, with a median longitudinal impunctate space; metasomal terga very weakly tessellate and shiny with distinct dense punctures; posterior depressional area occupying about 2/3 of tergum, very weakly tessellate; China (north).
..... **platydepressa**, n. sp.

* Wu (1985) recorded 2 *Simandrena* species, *A. (S.) wilkella* and *propinqua* (= *dorsata*) from Tianshan Tumorfeng Region, China, but the former belongs to *Taeniandrena* and the latter, which we could not examine in the collection of the Zoological Institute, Academia Sinica in the present study, is (deferred to the future study on its distribution in Eastern Asia.

17. Clypeus without a median longitudinal impunctate space; process of **labrum** emarginate in the middle; caudal fimbria brownish; veins and stigma pale yellowish; Yugoslavia to European Russia. **susterae** Alfken
- Clypeus with a median longitudinal impunctate transversely shagreened space; process of **labrum** not emarginate in the middle; caudal fimbria golden; veins and stigma brownish; Japan, China and Korea (south & central). **kerriae** Hirashima

Key to the Palearctic males of the subgenus *Simandrena*

1. Metasomal terga ferruginous; propodeal enclosure shagreened all over; dorsal face of propodeum tessellate, with shallow punctures, not roughened; metasomal terga 2-4 with dense, complete hair bands; clypeus with fulvous hairs; supraclypeal area punctate, not roughened. **transitoria** F. Morawitz
- Metasomal terga black; propodeal enclosure rugose at least on basal portion; dorsal face of propodeum roughened; metasomal terga 2-4 without complete hair bands. 2
2. Flagellar segment 1 longer than or as long as segment 2. 3
- Flagellar segment 1 shorter than segment 2. 6
3. Clypeus with a median longitudinal impunctate transversely shagreened space; clypeus with silvery, dense white hairs; metasomal terga 2-4 with moderately dense hair bands laterally; metasomal tergum 1 very weakly tessellate with small, dense, distinct punctures. **kerriae** Hirashima
- Clypeus without a median longitudinal impunctate space; clypeus without dense hairs; metasomal terga 2-4 with sparse, poorly developed hair bands. 4
4. Metasomal tergum 1 very weakly tessellate with microscopic fine punctures; dorsal face of propodeum roughened but with an indication of punctures; clypeus with fuscous hairs. **congruens** Schmiedeknecht
- Metasomal tergum 1 smooth and shiny, with distinct punctures. 5
5. Head with pale to dull yellowish hairs not mixed with blackish or brownish; mesoscutum weakly to densely tessellate medially; posterior depressional area of metasomal terga shiny and smooth with small punctures. **combinata** (Christ)
- Head with pale hairs admixed with many brownish to blackish ones on paraocular area, vertex and genal area; mesoscutum smooth and shiny medially. **nippon** Tadauchi et Hirashima
6. Metasomal tergum 1 shiny to very weakly tessellate, with distinct punctures. 7
- Metasomal tergum 1 weakly tessellate with minute punctures. 8
7. Propodeal enclosure distinctly rugose on 3/4 of basal portion; metasomal terga without hair bands; supraclypeal area tessellate and punctate, without rugulae; clypeus with whitish hairs; lower paraocular area tessellate with elongate punctures. **susterae** Alfken
- Propodeal enclosure rugose on basal half; metasomal terga 2-4 with poorly developed hair bands; supraclypeal area with rugulae; clypeus with black hairs; lower paraocular area weakly tessellate and shiny, with round punctures. **rhypara** Perez
8. Propodeal enclosure rugose on about basal half; clypeus weakly to densely tessellate with shallow punctures; hairs on clypeus pale to fuscous **dorsata** (Kirby)

- Propodeal enclosure distinctly rugose all over on 3/4 of basal portion. 9
- 9. Subapical margin of pronotum entire; metasomal sternum 7 with apical lobes narrow; sternum 8 with apical lobe slender; genital capsule with dorsal lobes of gonocoxite not projected; smaller, length about 8 mm. *yamato* Tadauchi et Hirashima
- Subapical margin of pronotum emarginate; metasomal sternum 7 with apical lobes broader, rounded; sternum 8 with apical lobe broad and widened apically; genital capsule with dorsal lobes of gonocoxite moderately produced; larger, length about 9 mm.
..... *opacifovea* Hirashima

1. *Andrena (Simandrena) combinata* (Christ)

(Fig. 1)

Apis combinatu Christ, 1791, Naturg. Insect., p. 187 [female; Germany].

Andrenu albibarbis Schenck, 1853, Jb. Ver. Natk. Nassau 9: 134 [male; W. Germany]; Wamcke, 1967, Eos, 43: 248.

Andrenu combinutu: Schmiedeknecht, 1882-1884, Apid. Europ., I, p. 771 [female & male]; E. Stockhert in Schmiedeknecht, 1930, Hym. Nord- und Mittel. europas, p. 932 [female], 983 [male]; Wu, 1982, Insects of Xizang, 392.

Andrenu suhlbergi F. Morawitz, 1888, Hor. Soc. ent. Ross. 22: 241 [female & male; Middle Siberia]; Wamcke, 1967, Eos, 43: 180, 306.

Andrena mehelyi Alfken, 1936, Veroff. Deutsch. Kol.-Ubers. Mus. Bremen, I. 3: 380 [female; Hungary]; Warncke, 1967, Eos, 43: 203, 287.

Andrenu (Simundrenu) combinutu: Warncke, 1968, Mem. Est. Mus. Zool. Univ. Coimbra, (307): 88; Osychnyuk, 1977, Fauna Ukraini, 12 (5): 239.

Distribution: Eurosiberian. China (northwest: Xinjiang Uygur Autonomous Region, Xizang); Middle Europe to European Russia; Middle Siberia.

Floral records: Osychnyuk (1977) recorded following flowers from European Russia: *Potentilla argentata*, *Trifolium pratense*, *Mutricuriu inodoru*, *Barbarea vulgaris*, *Melilotus officinalis*, *Inula britunicu*, *Picris hierucioides*.

Flight records: Female: mid June in China, early June to late July in European Russia. Male: early June to late July in European Russia.

Specimens examined (Females = F, Males = M): [China] Xinjiang Uygur Autonomous Region: 2F, Wuku Road, Tianshan north slope, 1600m, 11. vi. 1960 (Wang Shu-yong). We also examined European specimens as follows: 1F, Valais, nr. Verbier. c. 7,500 ft., Switzerland, 20-28. vi. 1959 (J.E. & R. B. Benson); 1F, Wilts, Gt. Bedwyn, 26. vii. 1969 (K. Guichard); 1F, Bosses Alpes, 24. vi. 1948 (PMF. Verhoeff); 1M, Doudogne, Sarlat, France, 20. iv. 1955; 1M, Varage, Marseilles, France, 22. iv. 1960.

Parasite: Unknown.

Remarks: This species has been recorded from Middle Europe to Middle Siberia and central China. The female of this species is distinctive in having the clypeus shagreened, dull and covered with dense pale hairs, the metasomal tergum 1 polished, shiny and smooth with dense punctures separated by one puncture widths, the apical depressional area of the metasomal terga shiny and smooth with dense punctures, the pygidial plate V-shaped with tessellate raised area, and the caudal fimbria golden.

2. *Andrena (Simandrena) tiunshana*, sp. nov.

(Figs. 2, 14)

Female. BL 10.5-11.2 mm, WL 8.0-8.5 mm ($n=3$).

Color: Mandible with apical third or less rufescent; wing membranes hyaline, moderately pale brownish, veins and pterostigma brownish; metasomal terga translucent reddish brown apically; distitarsi reddish brown; tibia1 spurs testaceous.

Pubescence: Hairs on head pale yellowish to fulvous; facial fovea dark brownish above and pale yellowish below; mesoscutum, scutellum and metanotum with short ($300-500\mu$), fulvous hairs; propodeal corbicula very well developed with dorsal fringe of fulvous, quite long ($600-1000\mu$), dense, well arranged hairs; dorsal face of propodeum with sparse, fulvous hairs; trochanteral floccus, small; tibia1 *scopa* moderately well arranged with fulvous hairs; T1 free of hairs medially, with short ($200-350\mu$), suberect hairs laterally; T1 with white hair fringe postlaterally, T2 with a hair band broadly interrupted medially, T3,4 with nearly complete to complete hair bands; *caudal* fimbria golden; S1,2 with short, dense, erect hairs medially, S2-5 with short, suberect, fulvous hairs posteriorly, with apical fringe very short.

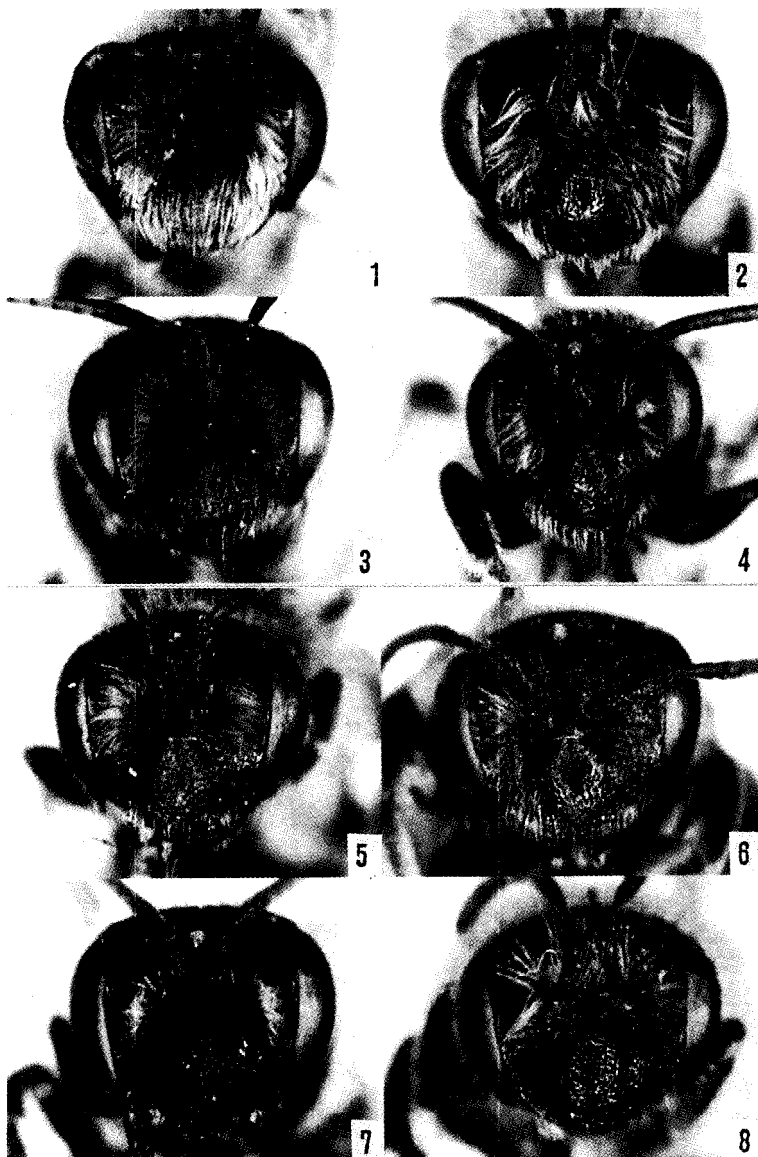
Structure: Head: HL/HW = 0.86 ± 0.03 ($0.83-0.88$, $n=3$). Antenna1 scape = first 4 flagellar segments; FL1 = FL2+3, FL2 > FL3, FL2 and FL3 broader than long. Eyes with inner margins converging slightly toward mandibles. Malar space linear. Process of labrum moderate in size, about 1.5 times as broad as long, trapezoidal to rounded apically, surface shiny. Clypeus quite convex with a longitudinal, median, shiny, wide impunctate space and with a narrow transverse impunctate space apically; clypeus smooth, polished with small, shallow, PP $\phi 20\mu$ and IS < 1, CPL = 1.0 mm. Lower paraocular area nearly smooth with strong, dense PP. Facial fovea broad, shallow, FVL = 1.4 mm, FVW = 0.5 mm. Vertex not rounded in frontal view. Genal area > eye seen in profile, GW:EW = 0.8:0.5, with minute PP crowded near eye, surface broadly shiny near eye and opaque, shagreened posteriorly. OOD:POD:OCD = 0.7:0.5:0.3. *Mesosoma:* Pronotum weakly tessellate, with sparse, shallow PP; pronotum with lateral suture slightly developed, rather long, without lateral rugulae, subapical margin of pronotum not emarginate. Mesoscutum moderately tessellate, with shallow PP $\phi 30\mu$ and IS = 1-1.5; scutellum shiny in the middle. Propodeal enclosure well defined by a suture, roughened on basal 2/3 and shagreened apically; dorsal face of propodeum roughened; corbicular area finely tessellate. Mesepisternum densely tessellate with shallow PP. Leg with middle basitarsus and hind basitarsus slightly tapering; hind tibia short. *Metasoma:* HW:MsW:MtW = 3.2:3.3:3.6. T1 basally weakly tessellate with minute, round PP $\phi 10-15\mu$ and IS = 1-3, apically very weakly tessellate to nearly smooth with sparser PP with very narrow impunctate shiny space at apices. T2-4 basally weakly tessellate with minute, dense PP $\phi 10-20\mu$ and IS = 1, apically smooth and shiny with no tessellation and small PP $\phi 10-20\mu$ and IS = 1-3; apical depressions of terga well indicated. Pygidial plate V-shaped with rounded apex, with moderately raised internal triangular area. S2-5 weakly tessellate with sparse, shallow PP.

Male. Unknown.

Distribution: China (northwest: Xinjiang Uygur Autonomous Region).

Floral record: Not available.

Flight record: Female: mid June.



Figs. 1-8: Heads in frontal view for 8 species of East Asian *Andrena* (*Simandrena*), 1: *combinata*; 2: *tianshana*, sp. nov.; 3: *koma*; 4: *yamato*; 5: *opacifovea*; 6: *austroinsularis*; 7: *wuae*, sp. nov.; 8: *nippon*.

Type material: Holotype female: Wuku Road, Tianshan north slope, 1600m, Xinjiang Uygur Autonomous Region, 11. vi. 1960 (Wang Shu-yong). Paratypes: [China] 1F, same data as holotype; 1F, same locality and collector as holotype, 13. vi. 1960.

Parasite: Unknown.

Remarks: This new species is somewhat similar to *A. koma* Hirashima in having the tibia1 scopa long, moderately well arranged, but is easily recognized by the clypeus being quite convex, smooth and polished with a broad longitudinal median impunctate space, the vertex with yellowish hairs not mixed with brownish ones, and the metasomal terga nearly smooth to weakly tessellate with dense distinct punctures.

3. *Andrena (Simandrena) koma* Hirashima

(Figs. 3, 12)

Andrena (Simandrena) koma Hirashima, 1952, *Mushi*, 24: 32 [female; Korea]; Tadauchi & Lee, 1992, *Esakia*, (32): 51 [Korea].

Distribution: China (new record: Shanghai, Jiangsu Prov.); Korea (south and central: Cheon La Buk, Kyong Sang Nam, Kyonggi, Kang Weon Dos).

Floral records: *Prunus donarium* var. *spontanea*, *Prunus persica*, *Lactuca debilis*.

Flight records: Female: late April to late May.

Type material: Holotype female (Kyushu Univ.): Suigen, Korea, 18. iv. 1938 (K. Sato).

Specimens examined: [China]: Jiangsu Prov.: Chinkiang (=Zhenjiang): 1F, 1. iv. 1919 (O. Piel); 1F, 3. iv. 1919. Shanghai: 1F, 2. iv. 1919 (O. Piel); 1F, 9. iv. 1920 (O. Piel); 1F, 10. iv. 1920 (O. Piel); 1F, 20. iv. 1925 (O. Piel); 1F, 6. v. 1925 (O. Piel); 1F, 16. iv. 1931 (O. Piel); 1F, 3. iv. 1932 (A. Savio); 4F, 19. iv. 1932 (A. Savio); 4F, 20. iv. 1932 (A. Savio); 17F, 13. iv. 1955 (Huang Ke-yen); 1F, Nan-Xiang, Shanghai, 24. iii. 1935 (T. C. Ma). [Korea]: Kyong Sang Nam Do: 1F, Sam Jeong Li, Ma Cheong Meon, Hamyang Gun, 15. v. 1991 (K. Morimoto). Cheon La Buk Do: 1F, San Lyong Li, San Nae Meon, Nam Weon Gun, 15. v. 1991 (Malaise trap). Kyonggi Do: 3F, Kang Nung, Pochon Gun, 24. iv. 1992 (O. Tadauchi). Kang Weon Do: 1F, Boung Myong Li, Dong San Meon, Chun Chon Gun, 26. iv. 1992 (T. Saigusa).

Parasite: Unknown.

Remarks: This species has been collected only females. The female is distinctive in having the well developed tibia1 scopa, the smoother propodeal enclosure and the tessellated metasomal terga. It is similar to *A. tianshana*, n. sp., but differs by the combination of characters given in the key.

4. *Andrena (Simandrena) yamato* Tadauchi et Hirashima

(Figs. 4, 13)

Andrena (Simandrena) opacifovea: Hirashima, 1952, *Mushi*, 24: 31, in part [description]; Hirashima, 1965, *J. Fac. Agr.*, Kyushu Univ., 13: 497, in part [description].

Andrena (Simandrena) yamato Tadauchi et Hirashima, 1983, *Esakia*, (20): 83 [female & male; Japan]; Tadauchi, 1988, *Bull. Nagasaki biol. Soc.*, (33): 4; Tadauchi, 1989, *A Check List*

of Jap. Insects, 685; Tadauchi & Lee, 1992, Esakia, (32): 50 [Korea].

Andrena (Simandrena) opacifovea koreana Kim et Kim, 1989, Kor. J. Entomol., 19: 202 [female; Korea]. **New synonym.**

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu, Sado Is., Tsushima Is., Yakushima Is.); Korea (south and central: Kyong Sang Nam, Cheon La Nam, Kyonggi, Kang Weon Dos).

Floral records: 36 flowering plants were recorded from Japan. Most specimens were collected on *Brassica napus*.

Flight records: Two generations a year. Female: mid March to early August. Male: early March to late May.

Type material: Holotype female (Kyushu Univ., no. 2422): Kuroubaru, Chikuhomachi, Fukuoka Pref., Japan, 7. iv. 1975 (O. Tadauchi).

Specimens examined: We record here the data from Korea only. [Korea]: Kyong Sang Nam Do: 2M, Sam Jeon Li, Ma Cheong Meon, Hamyang Gun, 11. v. 1991 (O. Tadauchi); 8M, 1. v. 1992 (O. Tadauchi). Cheon La Nam Do: Sim Won Valley, San Nae Meon, Nam Weon Gun: 1M, 13. v. 1991 (O. Tadauchi); 1F, 13. v. 1991 (T. Saigusa). Kyonggi Do: 10M, Kang Nung, Pochon Gun, 24. iv. 1992 (O. Tadauchi). Kang Weon Do: 2F4M, Pupan Meon, Hong Cheon Gun, 20. v. 1992 (O. Tadauchi); 4M, Gam Jong Li, Dong Meon, Chun Chon Gun, 21. v. 1992 (O. Tadauchi); Bong Myong Li, Dong San Meon, Chun Chon Gun: 14F5M, 22. v. 1992 (O. Tadauchi); 3F, 23. v. 1992 (O. Tadauchi).

Parasite: *Stylops yamatonis* Kifune et Hirashima (Kifune & Hirashima, 1985; Kifune & Maeta, 1990; Kifune, Tadauchi & Lee, 1994).

Remarks: This species is one of the most abundant species in Japan and South Korea. It mainly visits *Brassica napus* L. It is somewhat similar to European *A. dorsata* (Kirby) in having the tessellated metasomal terga. But the female of *A. yamato* is distinguished by the flagellar segment 1 shorter than 2+3 and the propodeal enclosure distinctly wrinkled all over. It is very close to *A. opacifovea* Hirashima, but can be separated by the smaller size, the pronotum with subapical margin not emarginate in the middle and without a median longitudinal line, the propodeal enclosure distinctly wrinkled all over and the male genital capsule with dorsal lobes of gonocoxite not projected.

5. *Andrena (Simandrena) opacifovea* Hirashima

(Fig. 5)

Andrena (Simandrena) opacifovea Hirashima, 1952, Mushi, 24: 31 [female & male; Japan]; Hirashima, 1965, J. Fac. Agr., Kyushu Univ., 13: 497.

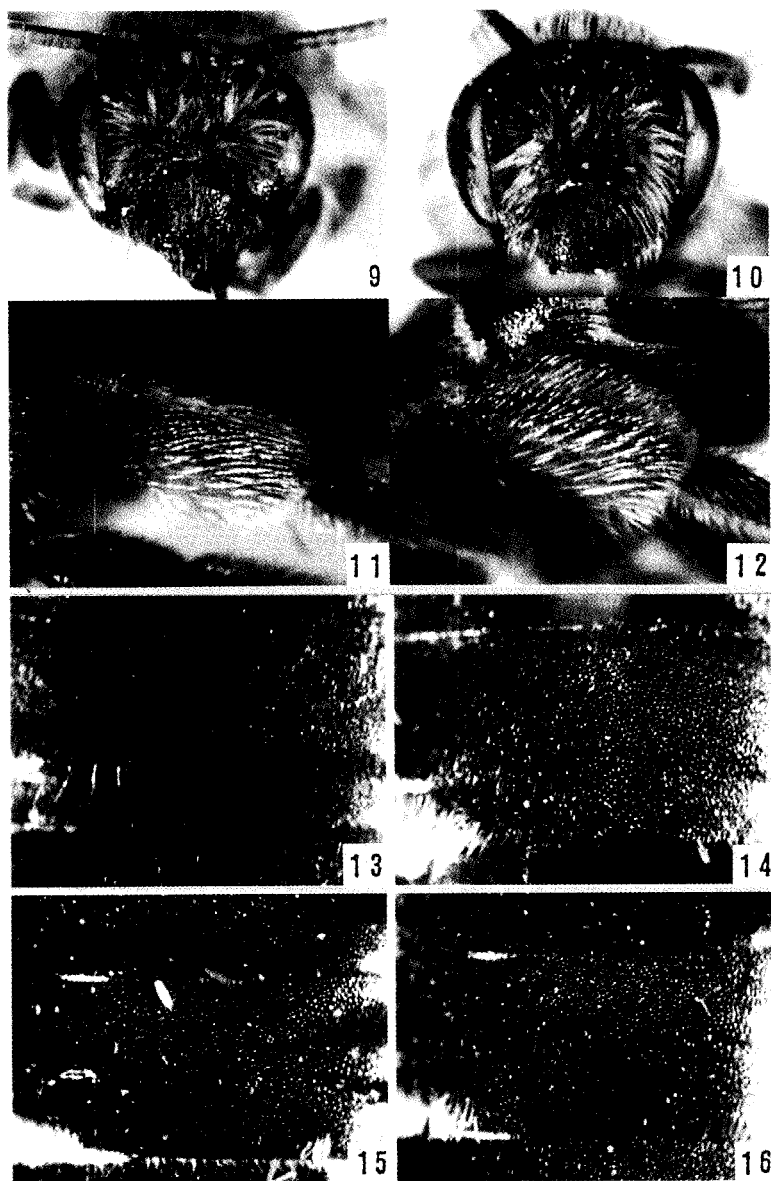
Andrena (Simandrena) opacifovea opacifovea: Tadauchi & Hirashima, 1983, Esakia, (20): 82; Tadauchi, 1988, Bull. Nagasaki biol. Soc., (33): 5; Tadauchi, 1989, A Check List of Jap. Insects, 685.

Distribution: Japan (Hokkaido, Honshu, Sado Is., Shikoku, Kyushu, Tsushima Is.).

Floral records: *Brassica napus*; *Acer* sp.; *Rosa multiflora*; *Ranunculus acris* var. *japonicus*.

Flight records: Female: mid April to early July. Male: mid April to late May.

Type material: Holotype male (Kyushu Univ.): Homanzan, Prov. Chikuzen (= Fukuoka Pref.), Japan, 19. iv. 1931 (K. Yasumatsu).



Figs. 9-16. Heads in frontal view of East Asian *Andrena* (*Simandrena*) (9 & 10), 9: *platydepressa*, sp. nov., 10: *kerriae*. Tibial scopae of hind leg (11 & 12), 11: *wuae*, sp. nov., 12: *koma*. Puncture distributions on 2nd metasomal tergum (13-16), 13: *yamato*; 14: *tiunshunu*, sp. nov.; 15: *wuue*, sp. nov.; 16: *plutydepressu*, sp. nov.

Parasite: *Stylops izumoensis* Kifune et Maeta (Kifune & Maeta, 1990).

Remarks: *A. opacifovea* is known to occur from Japan and has been split into two subspecies. In the present study we raise one of the subspecies, *A. opacifovea austroinsularis* to a full species. It is very closely related to *A. yamato* Tadauchi et Hirashima, but the flight season is later than that of *yamato*. This is a relatively poorly known species occurring throughout Japan. Tadauchi & Lee (1992) recorded one female of *opacifovea* from Korea, but we re-examined and recognized it *yamato*.

6. *Andrena (Simandrena) austroinsularis* Tadauchi et Hirashima, new status
(Fig. 6)

Andrena (Simandrena) opacifovea austroinsularis Tadauchi et Hirashima, 1983, Esakia, (20): 87. [female; Amami-Oshima Is., Japan].

Distribution: Japan (Amami-Oshima Is.).

Floral record: *Castanopsis cuspidata* var. *sieboldii*.

Flight record: Female: mid April.

Type material: Holotype female (Kyushu Univ., no. 2423): Hatsuno, Amami-Oshima Is., Japan, 12. iv. 1976 (H. Makihara).

Parasite: Unknown.

Remarks: *This* species is known by two females from Amami-Oshima Is., Japan. The female of this species differs from the related species, *A. opacifovea* and *A. yamato* by the hairs on vertex, mesoscutum and scutellum fuscous, the caudal fimbria fuscous, the pronotum with median longitudinal line obscure, the propodeal enclosure less wrinkled and tessellate on 1/3 of apical portion, and the T1 distinctly tessellate.

7. *Andrena (Sirnandrena) wuae* sp. nov.
(Figs. 7, 11, 15)

Female. BL 10.5-11.3 mm, WL 8.1-8.6 mm ($n=10$).

Color: Mandible with apical third or less rufescent; wing membranes hyaline, colorless or moderately pale brownish, veins and pterostigma pale brownish; metasomal terga translucent dark reddish brown apically; distitarsi dark reddish brown; tibia1 spurs testaceous.

Pubescence: Hairs on head white to pale yellowish; facial fovea brownish above and silvery below; mesoscutum with short (200-350 μ), white to yellowish hairs; hairs on scutellum and metanotum yellowish; propodeal corbicula very well developed with dorsal fringe of yellowish, quite long (700-1000 μ), dense, well arranged hairs; dorsal face of propodeum with sparse yellowish hairs; trochanteral floccus complete, small; tibia1 scopa moderately well arranged; T1 free of hairs medially, with short (300-400 μ), suberect hairs laterally; T1 with white hair fringe postlaterally, T2 with a hair band broadly interrupted medially, T3,4 with nearly complete to complete bands; caudal fimbria pale brownish; S1,2 with short, dense, erect hairs medially; S2-5 with short, suberect, pale hairs posteriorly, with apical fringe very short.

Structure: Head: HL/HW = 0.85 ± 0.05 (0.83-0.89, $n=10$). Antennal scape = first 4 flagellar

segments; $FL1=FL2+3$, $FL2$ slightly $< FL3$, $FL2$ and $FL3$ broader than long. Eyes with inner margins converging slightly toward mandibles. Malar space linear. Process of **labrum** moderate in size, about 2.5 times as broad as long, trapezoidal to rounded apically, occasionally weakly emarginate apically, surface shiny. Clypeus quite convex with a longitudinal, shiny, impunctate median space; clypeus smooth, shiny with $PP\phi 40\mu$ and $IS>0.5$, $CPL = 0.9$ mm. Lower paraocular area nearly smooth with strong, dense PP. Facial fovea very broad, shallow, $FVL=1.5$ mm, $FVW = 0.5$ mm. Vertex not round in frontal view. Genal area $>$ eye seen in profile, $GW:EW = 0.8:0.5$, with minute PP crowded near eye, opaque, shagreened posteriorly. $OOD:POD:OCD=0.7:0.5:0.3$. **Mesosoma**: Pronotum weakly tessellate, with weak, sparse PP; pronotum with lateral suture slightly developed, rather long, without lateral rugulae, subapical margin of pronotum not emarginate. Mesoscutum very weakly tessellate, shiny with strong $PP\phi 30-40\mu$ and $IS = 1-2$; scutellum and metanotum similar. Propodeal enclosure well defined, with lateral sutures distinct, slightly raised, with irregular rugulae basally, densely tessellate apically, not wrinkled; dorsal face of propodeum roughened, corbicular area finely tessellate. Mesepisternum weakly tessellate and shiny with dense PP anteriorly, densely tessellate posteriorly. Leg with middle basitarsus slightly expanded medially, hind basitarsus slightly tapering; hind tibia short. **Metasoma**: $HW:MsW:MtW = 3.3:3.2:3.5$. T1 basally smooth and shiny with deep, round $PP\phi 30\mu$ and $IS = 0.4-1$, apically punctate with smaller and shallower punctures than those in basal areas and with very narrow impunctate shiny space at apices. T2-4 basally smooth and shiny with $PP\phi 20\mu$ and $IS = 0.4-1$, apically with sparser PP $IS = 1-3$; apical depressions of terga weakly indicated. Pygidial plate V-shaped with rounded apex, with moderately raised internal triangular area. S2-5 sparsely punctate and reticularly shagreened except for weakly tessellate basal and apical narrow areas.

Male. Unknown.

Distribution: China (Beijing, Hebei Province).

Floral record: *Brassica* sp.

Flight records: Female: mid June to late July.

Type material: Holotype female: Xiao-Wutaishan, 1400m, Hebei Prov., 11. vii. 1964 (Han Yan-hen). Paratypes. [China]: Hebei Prov.: Xiao-Wutaishan, 1400m: 4F, 11. vii. 1964 (Han Yan-hen); 1F, 16. vii. 1964 (Han Yan-hen). Beijing: 9F, Mentougou, 26. vii. 1985 (Wang Shu-yong) (one of them was stylized by *Stylops nipponicus*); 1F, Badaling, 700m, 15. vi. 1964 (Ge Shu-mei); 1F, Badaling, 700m, 25. vi. 1964 (Liao Shu-bai); Xiaolongmen: 4F, 24. vii. 1991; 1F, 28. vii. 1991 (Shi Yong-shan); 2F, 30. vii. 1991 (Shi Yong-shan); 1F, Donglingshan.

Parasite: One female of this species was stylized by *Stylops nipponicus* Kifune et Maeta, which was recorded from *Andrena nippon* (Kifune & Maeta, 1990). This is the new record of this species from China (identified by Dr. T. Kifune).

Remarks: This new species is similar to the European *A. lepida* Schenck. It differs from *lepida* by the smoother clypeus and wider facial fovea, the supraclypeal area not roughened, the metasomal hair bands on terga 3,4 complete and the pygidial plate with raised area not tessellate.

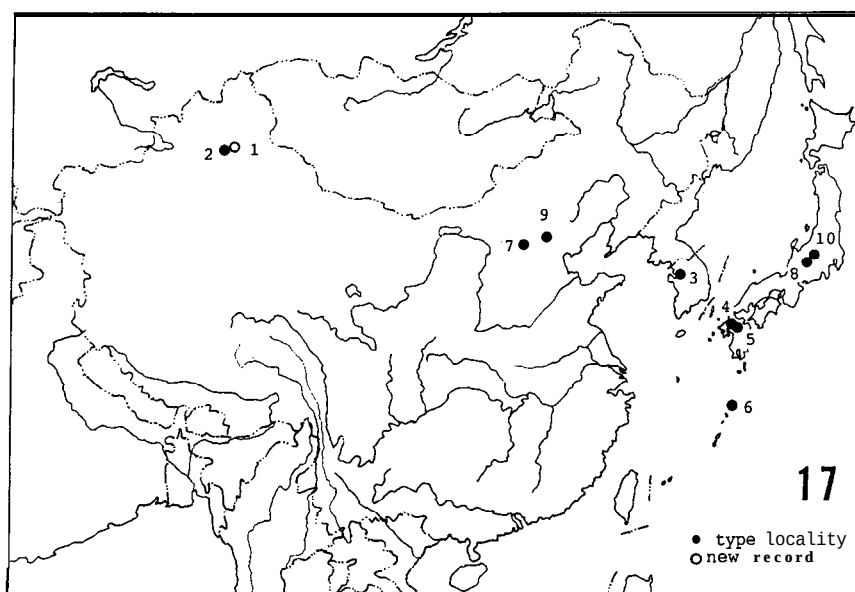


Fig. 17. A map showing type localities of 9 Asian *Andrena* (*Simandrena*) including a locality of 1 Euro Siberian species in Eastern Asia, 1: *combinata*; 2: *tianshana*, n. sp.; 3: *koma*; 4: *yamato*; 5: *opacifovea*; 6: *austroinsularis*; 7: *wuae*, n. sp.; 8: *nippon*; 9: *platydepressa*, n. sp.; 10: *kerriae*.

8. *Andrena* (*Simandrena*) *nippon* Tadauchi et Hirashima

(Fig. 8)

Andrena (*Simandrena*) *kerriae*: Hirashima, 1965, J. Fac. Agr., Kyushu Univ., 13: 499, in part [description].

Andrena (*Simandrena*) *nippon* Tadauchi et Hirashima, 1983, Esakia., (20): 89 [female & male; Japan]; Tadauchi, 1989, A Check List of Jap. Insects, 685.

Distribution: Japan (northern and central Honshu).

Floral records: *Brassica napus*, *Capsella bursa-pastoris*, *Taraxacum albidum*.

Flight records: Two generations a year. Female: early May to mid May, and late July to late August. Male: mid May, and late July.

Type material: Holotype female (Kyushu Univ., no. 2424): Hatahoko, Mt. Norikura, Gifu Pref., Japan, 8. v. 1976 (O. Tadauchi).

Parasite: *Stylops nipponicus* Kifune et Maeta (Kifune & Maeta, 1990).

Remarks: *A. nippon* is known only from Japan and is similar to *A. kerriae* Hirashima in having the thorax covered with fulvous hairs dorsally and the metasomal terga densely punctate. It differs from *kerriae* by the clypeus shiny and smooth with distinct punctures, and the propodeal enclosure weakly rugose on basal half.

9. *Andrena (Simandrena) platydepressa* sp. nov.

(Fig. 9, 16)

Female. BL 9.0-9.6 mm, WL 7.1-7.5 mm ($n=10$).**Color:** Mandible with apical fourth rufescent; wing membranes hyaline, moderately pale brownish, veins and pterostigma brownish; metasomal terga translucent reddish brown apically; distitarsi reddish brown; tibia1 spurs testaceous.**Pubescence:** Hairs on head pale yellowish mixed with pale brownish on vertex; facial fovea dark brownish above and yellowish below; mesoscutum, scutellum and metanotum with short (200-400 μ), fulvous hairs; propodeal corbicular very well developed with dorsal fringe of fulvous, quite long (800-1000 μ), dense, well arranged hairs; dorsal face of propodeum with sparse fulvous hairs; trochanteral floccus small; tibia1 *scopa* fulvous, very short, not arranged; T1 free of hairs medially, with short (300-400 μ), suberect hairs laterally; T2,3 with hair bands broadly interrupted medially, T4 with a complete band; caudal fimbria brownish; S1,2 with short, dense, erect hairs medially; S2-5 with short, suberect, fulvous hairs posteriorly, with apical fringe very short.**Structure:** Head: HL/HW = 0.83 ± 0.05 (0.80-0.87, $n=10$). Antenna1 scape slightly < first 4 flagellar segments; FL1 slightly > FL2+3, FL2 < FL3, FL2 and FL3 broader than long. Eyes with inner margins converging slightly toward mandibles. Malar space linear. Process of labrum moderate in size, about 1.5 times as broad as long, trapezoidal, surface shiny. Clypeus quite convex with a longitudinal, median impunctate space, weakly tessellate apically, weakly and transversely shagreened basally; clypeus with round distinct PP ϕ 20 μ and IS = 0.5, CPL = 0.9 mm. Lower paraocular area nearly smooth with strong, dense PP. Facial fovea moderately broad, shallow, FVL = 1.5 mm, FVW = 0.5 mm. Vertex rounded in frontal view. Genal area slightly > eye seen in profile, GW:EW = 0.6:0.5, with minute PP crowded near eye, surface shagreened, opaque nearly all over. OOD:POD:OCD = 0.6:0.4:0.3. **Mesosoma:** Pronotum moderately tessellate, with sparse, shallow PP; pronotum with lateral suture slightly developed, rather long, without lateral rugulae; subapical margin of pronotum not emarginate. Mesoscutum moderately tessellate, with shallow PP ϕ 30 μ and IS = 1-2; scutellum shiny in the middle. Propodeal enclosure well defined by a suture, and rugose on basal half, tessellate apically; dorsal face of propodeum roughened; corbicular area finely tessellate. Mesepisternum weakly tessellate with shallow PP. Leg with middle basitarsus slightly expanded medially and hind basitarsus slightly tapering; hind tibia short. **Metasoma:** HW:MsW:MtW = 3.0:2.9:3.2. T1 basally very weakly tessellate with PP ϕ 20 μ and IS = 0.5, apically weakly tessellate with sparser PP in basal areas and with very narrow impunctate shiny space. T2-4 basally weakly tessellate with distinct PP ϕ 20 μ and IS = 0.5-1; apical depressional area very wide occupying more than one half of tergum and very weakly tessellate and shiny with sparse, small PP, IS = 2-3. Pygidial plate V-shaped with rounded apex, with moderately raised internal triangular area. S2-5 weakly tessellate with moderately dense, shallow PP medially.**Male.** Unknown.**Distribution:** China (north: Beijing).**Floral record:** *Brassica chinensis*.**Flight records:** Female: late April to early May.

Type material: Holotype female: Xiangshan, Beijing, China, 27. iv. 1973 (Wu Yan-ru). Paratypes: [China]: Beijing: Xiangshan: 2F, 27. iv. 1973 (Wu Yan-ru); 6F, 6. v. 1977 (Wu Yan-ru); 1F, 26. iv. 1974 (Wang Shu-fang).

Parasite: Unknown.

Remarks: This new species is a close relative of *A. kerriae* Hirashima. It can be separated from *kerriae* by the metasomal terga with basal area densely punctate and with broad apical depressional area sparsely punctate, nearly smooth and shiny, the vertex with brownish hairs, and the propodeal enclosure less rugose.

10. *Andrena (Simandrena) kerriae* Hirashima

(Fig. 10)

Andrena (Simandrena) kerriae Hirashima, 1965, J. Fac. Agr., Kyushu Univ., 13: 499 [female; Japan]; Hirashima, 1966, J. Fac. Agr., Kyushu Univ., 14: 106; Tadauchi & Hirashima, 1983, Esakia, (20): 87; Tadauchi, 1988, Bull. Nagasaki biol. Soc., (33): 5; Tadauchi, 1989, A Check List of Jap. Insects, 685; Tadauchi & Lee, 1992, Esakia, (32): 51.

Distribution: China (new record: Heilongjiang Prov., Beijing); Japan (Hokkaido, Honshu, Sado Is., Shikoku, Kyushu, Tsushima Is.); Korea (south and central: Kyon Sang Nam, Chon La Buk, Kyonggi, Kang Weon Dos).

Floral records: *Taraxacum officinale*, *Capsella bursa-pastoris*, *Potentilla kleiniana*, *Rubus* sp., *Cornus controversa*, *Brassica napus*, *Corydalis platycarpa*, *Weigera* sp., *Brassica chinensis*, *Kerria japonica*, *Prunus armeniaca* var. *ansu*, *Salix* spp.

Flight records: Female: early April to early June. Male: mid April to late May.

Type material: Holotype female (Kyushu Univ.): Sanjiro, Utsukushigahara, Nagano Pref., Japan, 7. v. 1961 (Y. Hirashima).

Specimens examined: We record here the data from China and Korea only. [China]: Heilongjiang Prov.: Jingpo Lake, Mudanjiang all by 0. Tadauchi: 1F, 23. v. 1993; 3F, 24. v. 1993; 1F, 25. v. 1993. [Korea]: Kyon Sang Nam Do: 4F, Sam Jeon Li, Ma Cheong Meon, Hamyang Gun, 1. v. 1992 (0. Tadauchi). Cheon La Buk Do: 2F, San Lyong Li, San Nae Meon, Nam Weon Gun, 2. v. 1992 (0. Tadauchi). Kyonggi Do: 2F1M, Kang Nung, Pochong-gun, 23. iv. 1992 (0. Tadauchi). Kang Weon Do: 1M, Gam Jong Li, Dong Meon, Chun Chon Gun, 25. iv. 1992 (0. Tadauchi); 3F, Boug Myong Li, Dong San Meon, Chun Chon Gun, 26. iv. 1992 (0. Tadauchi); 2F, Ogari, Seon Myon, Yang Yang Gun, 27. iv. 1992 (0. Tadauchi); 2F, Pupan Meon, Hong Cheon Gun, 20. v. 1992 (0. Tadauchi).

Parasite: *Stylops yamatonis* Kifune et Hirashima (Kifune, Tadauchi and Lee, 1994).

Remarks: This is similar to the European *A. susterai* Alfken. It differs from *susterai* by the clypeus weakly convex with a median longitudinal impunctate space transversely shagreened, the process of labrum not emarginate in the middle and the male clypeus with dense silvery white hairs.

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